

The influence of the immune system and physical effort on mechanisms of neurodegeneration

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Abstract

Background. It is known that the immune system suffers a general depression of its functions correlated with aging and also an imbalance between its components: some cell populations decline, others are activated; there is also a shift in the synthesis of the cytokines and stress hormones. New insights in the field of neurodegeneration showed that the pro-inflammatory status found in elderly people might be responsible for the Alzheimer's disease onset. On the other hand physical effort was shown to have a neuron protective role in patients suffering from Alzheimer's disease.

Aims. The aim of the study was to evaluate the immune status in an aged population, regarding the levels of the cytokines and the number and function of some lymphocytic populations. These results were correlated with mental evaluation tests, in order to test the hypothesis described above. This could promote a new therapeutic intervention, i.e. the use of anti-inflammatory drugs in Alzheimer's disease. Another objective of this study was to test the influence of physical effort on the cognitive function in elderly people.

Methods. 45 patients aged between 60 and 80 years, were investigated regarding the levels of pro-inflammatory cytokines (TNF- α , IL-1, IL-6, IFN- γ), and of the peripheral populations of leukocytes. They were also assessed for manifestations of dementia (DSM-IV criteria and MMSE). The cognitive evaluation tests were repeated after 6 months of intensive physical exercise, in order to assess a presumed improvement of the mental status, following the neuronal changes induced by effort.

Results. We found that our patients presented a pro-inflammatory status, consisting in raised levels of TNF- α , IL-1, IL-12, IFN- γ , a predominance of neutrophils in the periphery with a poor function, a decrease in function and number of lymphocytes. The tendency for a pro-inflammatory status was accentuated in patients with dementia. The physical effort induced an improvement in MMSE scores in all the patients, and even a higher one in those who did not suffer from Alzheimer's disease.

Conclusions. Our data sustain the actual hypothesis of the implication of the immune system in the occurrence and evolution of dementia in elderly people. Immune-modulating therapy and physical effort can contribute as adjuvants to the future therapy for Alzheimer's disease.

Keywords: Alzheimer's disease, pro-inflammatory cytokines, mental status evaluation, aged people immune status, physical effort.